Journal of the Society of Arts.

FRIDAY, APRIL 17, 1863.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following circular, with an abstract of the proceedings of the General Meeting held on the 7th Feb., has been issued to the members:—

Society of Arts, Adelphi, London, W.C., Feb., 1863.

SIR,—I am directed to bring to your notice the subjoined proceedings of a Special General Meeting of this Society, held on Saturday, the 7th instant.

Should you desire to have your name placed on the list of subscribers, I shall feel obliged by your filling in the accompanying paper, and returning it to me, with your subscription, which may be in the form of a post-office order or cheque, made payable to the Financial Officer, Mr. Samuel Thomas Davenport, and crossed Coutts and Co. I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

The subscription of each member is limited to one guinea.

The following additional names have been received up to the 16th inst.:—

Baldry, James Danford	1	1	0
Barton, W. H.	1	1	0
Brown, John William	1	1	0
Brown, Samuel	1	1	0
Burton, Decimus, F.R.S.	1	1	0
Chawner, R. C.	1	1	0
Cox, William Thomas	1	1	0
Crampton, Thomas Russell	1	0	0
Davis, Frederick	1	1	0
Dobson, Benjamin	1	1	0
Edmiston, Charles S.	1	1	0
Fowler, John	1	1	0
Fuller, Francis	1	1	0
Green, Stephen	1	1	0
Hyde, John	0	10	6
Hudson, Alfred	0	10	6
Jackson, John, jun.	1	1	0
Kerr, W. H.	1	1	0
Lawes, Thomas	1	1	0
Martin, Peter, J.P.	1	1	0
Mason, Hugh	1	1	0
Mathews, George	1	1	0
Moffat, Major Augustus Hay	1	1	0
Nightingale, C.	1	1	0
Paget, Capt. Leopold Grimstone, R.A.	1	0	0
Pain, George	0	10	6
Palmer, Philip	1	1	0
Ridley, Arthur S.	1	1	0
Sharples, Joseph	1	1	0
Shaw, Bentley	1	1	0
Simons, George	1	0	0
Smith, J. B., M.P.	1	1	0
Smith, Richard	1	1	0
Solly, Samuel Reynolds, F.R.S.	1	1	0
Somes, Joseph	1	1	0
Sowerby, William	1	1	0
Spence, James	1	1	0
Spink, Daniel	1	1	0
Stone, David H.	1	1	0
Symonds, John	1	1	0
Taylor, William	1	1	0
Towle, John	1	1	0
Tyer, Edward	1	1	0
Vallentin, James	1	1	0
Vaughan, John	1	1	0
Watkins, William	0	10	6
Westley, William	1	1	0
Westmacott, Richard, R.A.	1	1	0
Wheatcroft, Joseph	1	1	0
Williams, John Wrigley	1	1	0
Woodd, Robert B.	1	0	0
York, The Archbishop of	1	1	0

ADDRESSES TO HER MAJESTY AND HIS ROYAL HIGHNESS THE PRINCE OF WALES.

A general meeting of the members of the Society was held on Friday, the 10th instant, at half-past four, p.m., for the purpose of voting addresses to her Majesty the Queen, and his Royal Highness the Prince of Wales, on the marriage of his Royal Highness. W. H. BODKIN, Esq., Assistant-Judge, Vice-President of the Society, took the chair.

The SECRETARY having read the advertisement convening the meeting,

The CHAIRMAN said—Gentlemen, I feel sure that this is not an occasion upon which you will consider it necessary that much time should be occupied in alluding to the happy event which has assembled us together. You will, I think, agree with me that no formal speeches are needed on this occasion; and I feel that I shall best consult the wishes of the meeting by proposing from the chair a resolution which cannot but meet your hearty concurrence, namely, "That addresses of congratulation be presented to her Majesty the Queen and his Royal Highness the Prince of Wales, on the marriage of his Royal Highness." I will call upon the Secretary to read those addresses, and in the event of their meeting with your approbation, the next resolution which will be submitted to you will be that the Council be requested to place the common seal of the Society to those addresses.

The SECRETARY then read the proposed addresses to Her Majesty and his Royal Highness the Prince of Wales. These will be published in the *Journal* as soon as they have been presented.

The addresses having been unanimously agreed to,

Mr. Harry Chester, Vice-President, said—I beg leave to move, "That the Council be requested to affix the Common Seal of the Society to the addresses now agreed to, and to take the necessary steps for presenting the same to Her Majesty and His Royal Highness the Prince of Wales."

The resolution, having been seconded by Mr. William Hawes, was unanimously adopted.

The Chairman said—I think, gentlemen, although no formal speeches have been made on this occasion, I cannot, in the prominent position which I occupy to-day, allow the meeting to separate without saying one word upon the occasion which has called us together. We have lately seen an exhibition of feeling in this metropolis unequalled, I believe, in any country at any time, of regard and affection for the illustrious lady whom the heir to the throne has selected as his wife. I may be excused for saying that I had an opportunity of seeing that lady on the Continent, having been near her for some hours, and I was charmed, as every one must be, with her appearance and manner, and more than charmed by seeing the strong affection which evidently existed between her and her intended husband. I am sure we shall all gladly unite in the prayer for their happiness, not forgetting one consequence which I hope may result from this union, namely, that it may have the effect of in some degree dispelling the gloom caused by that heavy affliction with which it has pleased Providence to visit the highest person in this realm. I am sure you will all much rejoice if that effect is produced, and I believe there are some symptoms which tend to encourage such a hope. If the Prince of Wales shall, in the course of his future career, justify the expectations that are formed with respect to him, holding, as he is destined to do—we hope at a very distant day—the highest position in Europe—indeed, in the world—we shall not forget how much is due to the example of his parents, and particularly to the training and influence of that illustrious man who so long presided over this Society, and whose loss we shall never cease to deplore. Surely to him may with truth be applied those words which were used with reference to one of England's noblest sons—

"Those bright laurels ne'er will fade with years,
Whose leaves are watered by a nation's tears."

The proceedings then terminated.

EIGHTEENTH ORDINARY MEETING.

Wednesday, April 15, 1863.

The Eighteenth Ordinary Meeting of the One Hundred and Ninth Session was held on Wednesday, the 15th inst., Richard Westmacott, Esq., R.A., in the chair.

The following candidates were proposed for election as members of the Society:—

Blore, John	8, Michael's-place, Brompton, S.W.
Bolton, Thomas Henry	14, Thornhill-crescent, N.
Boothby, John L.	18, Notting-hill-square, W.
Chatfield, Frederick	12, Pall-mall, S.W.
Clarke, Joseph, F.S.A.	13, Stratford-place, W.
Clement, John H.	3, Gloucester-terrace, Church-street, Kensington, W.
Freyberg, James	11, Grosvenor-street West, Eaton-square, S.W.
Waters, Robert S.	St. Giles, Dorset.

The following Candidates were balloted for and duly elected members of the Society:—

Allan, William	12, Marquess-villas, Canonbury, N.
Appleby, Samuel	6, Harpur-street, Red Lion-square, W.C.
Battye, Richard F., M.D.	6, Gloucester-street, Belgrave-road, S.W.
Belany, Archibald	37, Clarendon-road, Kensington-park, W.
Bennet, James Lindsay	2, Taviton-street, Gordon-square, W.C.
Catto, John	30, Milner-square, Islington, N., and 50, Upper Thames-street, E.C.
Lloyd, George Alfred	30, John-street, Bedford-row, W.C.
Muirhead, J.	Electric Telegraph Company, Gloucester-road North, Regent's park, N.W.
Parsons, John Meeson	6, Raymond-buildgs., Gray's-inn, W.C.
Puller, Arthur Giles	Athenæum Club, S.W., and 14, Portland-place, W.
Rhodes, Henry	86, Cambridge-street, Pimlico, S.W.

The following Institution has been received into Union since the last announcement:—

Holloway (N.) Literary Institute.

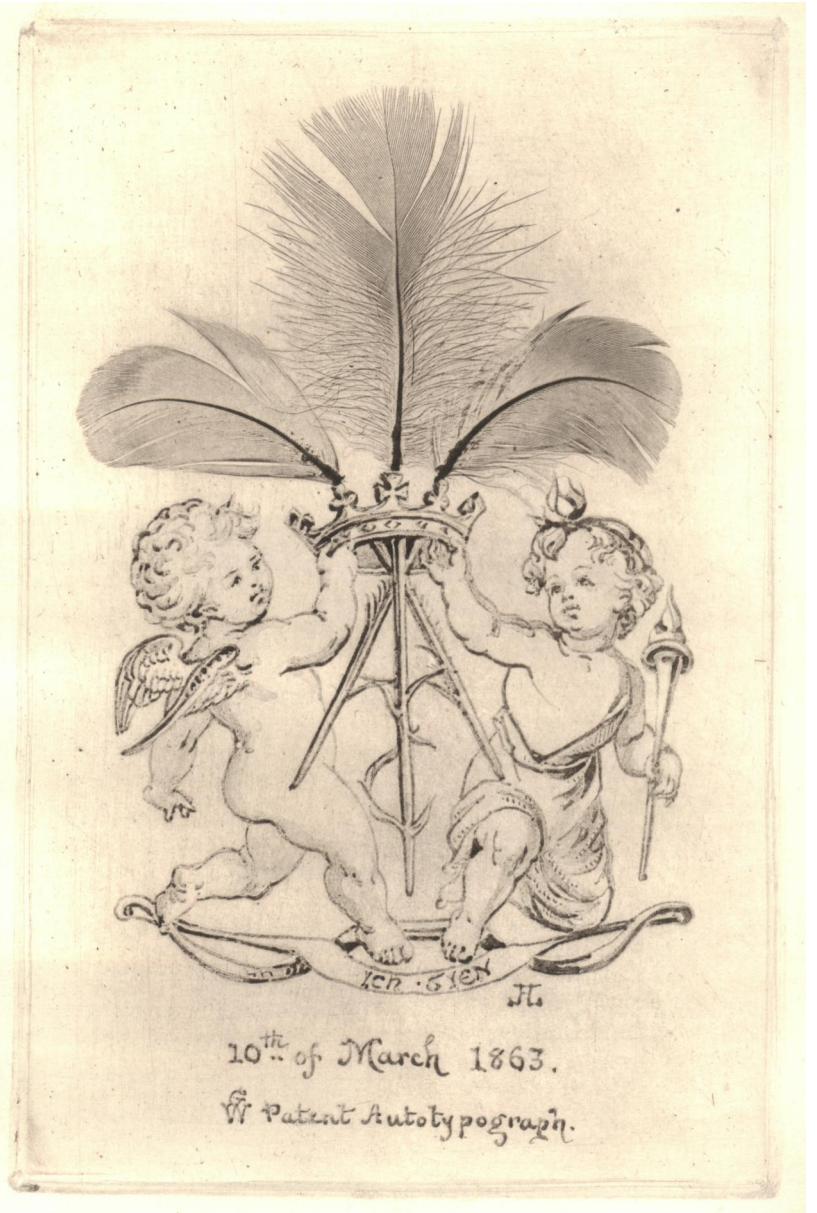
The Paper read was—

THE NEW ART OF AUTO-TYPOGRAPHY.

By George Wallis.

As the new art-process for the re-production of drawings to which I am about to call attention, and as far as possible describe and illustrate before you, is based in principle upon a process of an analogous character, by which certain classes of natural objects are engraved and printed, popularly known as Nature-Printing, I think it desirable, from my personal connection with the two gentlemen who certainly originated the direct method of Nature Engraving, as I prefer to call it, in this country, and my knowledge of their early efforts, to endeavour briefly to correct a wrong impression which I believe to have been unintentionally given, through an imperfect knowledge of the true facts and the dates at which the first experiments were made in England.

In a paper read at the Royal Institution, 11th May, 1855, by the late Mr. Henry Bradbury, to whose ability, energy, and perseverance, the art of nature-printing owes so much, and also in a more recent publication, the early attempts to obtain impressions from plants, &c., are carefully traced up. In these papers Mr. H. Bradbury gives the credit, which is evidently due, to a Danish goldsmith and engraver, Peter Kyhl, of Copenhagen, as having been the first to produce impressions in metal plates direct from natural objects; but whilst honourably seeking to do



10th of March 1863.

W Patent Autotypograph.

justice to an ingenious man, who unfortunately died in 1833, the year in which he made his invention known, he does a certain measure of injustice to the late Mr. Richard Ford Sturges and Mr. W. C. Aitken, of Birmingham, on the assumption that the experiments made by the former in August, 1851, and the latter in the spring of 1852, were based upon a knowledge of what Peter Kyhl had done. I have no hesitation, therefore, cognisant as I am of nearly all the earlier efforts in this direction at Birmingham, to declare that neither Mr. R. F. Sturges nor Mr. W. C. Aitken knew anything whatever of Kyhl or his experiments, and did not even know that such a person ever existed prior to the publication of the paper read by Mr. Henry Bradbury at the Royal Institution, more than three years after Mr. R. F. Sturges' patent for the ornamentation of metals by pressure, which process he claimed as his invention, had been taken out.

I have felt it my duty to state this, because I purpose bringing out the true dates in connection with the invention of the process of Nature Printing, leading as this process does to that which I am about to describe and illustrate, and of which I claim to be the inventor.

That the Danish goldsmith and engraver, Peter Kyhl, did, in the year 1833, exhibit at the Exhibition of Industry, held at Charlottenberg, various productions in silver, decorated by a process described in a manuscript, entitled "The description (with forty-six plates) of a Method to Copy Flat Objects of Nature and Art," dated 1st May, 1833, and that the plates "represented printed copies of leaves, of linen and woven stuffs, of laces, of feathers of birds, scales of fishes, and even serpent skins," we have the authority of the late Mr. Henry Bradbury, based on that of Professor Thiele, and therefore we may accept it as a fact; but that this fact had anything to do with the experiments instituted at Birmingham, in August, 1851, by Mr. R. F. Sturges, in the engraving of lace, and early in 1852, by Mr. W. C. Aitken, in engraving skeletons of leaves, feathers, &c., by placing the objects between two plates of metal and subjecting them to pressure by steel rolls, I emphatically deny. The truth is, Kyhl's process had been evidently forgotten, and his manuscript, buried in the archives of the library at Copenhagen, was not dug up until the Imperial Printing Establishment at Vienna had given dignity to the process of nature printing, and Mr. Henry Bradbury had brought the invention from Vienna, where it was practised, and, by his skill and ingenuity, had begun to produce the works which are so worthily associated with his name.

The facts are these. In August, 1851, the late Mr. R. F. Sturges made some experiments in direct engraving, by placing pieces of lace between two Britannia metal plates, and passing them through a pair of steel rolls, revolving at a suitable pressure, his object being to devise some cheap and rapid process for the ornamentation of metals. A little specimen in one of the frames before you is an impression printed from one of the plates so engraved at this period. Mr. Sturges took out a patent for "ornamenting metallic surfaces," based upon the results he had arrived at. This patent is dated 24th January, 1852.* Specimens were shown about as curiosities, especially impressions printed from the plates. In assisting to bring this patent into operation, in the establishment of Messrs. R. W. Winfield and Son, Cambridge-street Works, Birmingham, Mr. W. C. Aitken made his first experiment on natural objects with a skeleton leaf, picked out of a roadside brook, early in the spring of 1852. An impression of this, together with one of the two plates, which Mr. Aitken presented to me, are now before you. This result was shown to me in a day or two after it was produced; therefore, I am speaking from experience, and not from hearsay, or upon any authority. Mr. Aitken subsequently brought the further results of his experiments before this Society, in a paper read in February, 1854, and printed in the *Society of Arts Journal*, vol. ii. p. 227.

* Patent No. 13,914.

In Mr. Henry Bradbury's paper, read at the Royal Institution, he says, "In the Imperial Printing Office at Vienna the first application of taking impressions of lace in plates of metal by means of metal rollers, took place in the month of May, 1852. It originated in the Minister of the Interior, Baumgartner, having received specimens from London, which so much attracted the attention of the Chief Director, that he determined to produce others like them." Now we all know what the Imperial Printing Office of Vienna showed in the Great Exhibition of 1851; and, beautiful, and even wonderful, as the specimens were, that there was nothing in any way approaching to nature printing. The Austrian Commission, however, was busily employed in London until the end of 1851 or beginning of 1852. Its members visited Birmingham, as our foreign friends usually do on these occasions, as a relaxation from heavy duties, and from a laudable desire to obtain information.

Mr. R. F. Sturges was not a man to "hide his light under a bushel," and therefore I have little doubt that the specimens of impressions of lace from plates engraved by him were sent to the Austrian Minister of the Interior, being obtained, either directly or indirectly, from Mr. Sturges immediately after he had secured himself in England by patent. If not, where did they come from? No one else in this country had at this period done anything of the kind. Peter Kyhl had been dead and his experiments at Copenhagen forgotten, where alone they had been known eighteen years before.

If we compare the date of Mr. R. F. Sturges' patent, January 24th, 1852, with the date given by Mr. H. Bradbury, May in the same year, as the period of the first experiments at the Imperial Printing Office at Vienna, it will be seen at once that Mr. Sturges had no object in the concealment of his process, or its results, for three months before anything was known or done at Vienna.

In making these remarks, I do so for the honour of Birmingham, and from a strong conviction, based on a personal knowledge of the facts, and not from hearsay, that the action of the Imperial Printing Office at Vienna was induced by the successful experiments made in Birmingham in 1851-2.

Having thus, as an act of justice to an ingenious manufacturer, stated these facts as to the independent re-invention, at least, of this process, assuming Peter Kyhl's to have slept—as it really did—not only from 1833 to 1851, but, in fact, to 1855, when it was brought forward through the instrumentality of Professor Thiele, I may now briefly allude to the several processes employed for the reproduction of flat natural objects by means of metal plates and the printing press: the nature printing of Dr. Dresser by transfer from leaves of plants, &c., to paper direct, and his process of transfer to lithographic stones and printing therefrom, being outside the present question, although very interesting and useful in many points.

In 1847, Dr. Branson, of Sheffield, made a series of experiments, commencing with taking impressions of leaves in gutta percha, from which he cast a brass mould to print from. An electrotype plate could also be obtained. In 1851, Dr. Branson brought this interesting subject and his processes before the Society of Arts.

After the Imperial Printing office at Vienna had experimented upon lace, &c., in 1852, as already mentioned, we have Mr. Henry Bradbury's authority for stating that gutta-percha was tried by Andrew Worring, in whose name the patent was subsequently taken out. No doubt this plan was derived from Dr. Branson. This failing, he, says Mr. Bradbury, "employed," as Peter Kyhl had done before him, "soft lead plates." Yet, probably, Worring was as innocent of any knowledge of Kyhl's doings as Mr. Sturges was. This Mr. H. Bradbury acknowledges with regard to the former, and it is deeply to be regretted that he did not do so in regard to the latter, as I think that Worring, being connected with such an establishment as the Imperial Printing Office at Vienna, was much more

likely to know of the existence of Peter Kyhl's manuscript in the Royal Library at Copenhagen, than a busy manufacturer at Birmingham. Mr. Henry Bradbury's process was taken from that practiced at the Imperial Printing Office at Vienna, where he was engaged for a period, with such improvements as his great ingenuity and perseverance enabled him to introduce; and we see the result in the magnificent volumes published by Messrs. Bradbury and Evans.

In all these processes, however, the plate from which the impressions had to be printed was an electrotype copy of the soft lead plate in which the object was engraved, and a considerable amount of labour and skill in burnishing and touching up had to be expended before the plate was fit to yield a satisfactory impression.

This is not the case with the direct process, or with Mr. R. F. Sturges' method of copying lace, &c., and more particularly as carried out in reference to natural objects by Mr. W. C. Aitken. The impressions of the most delicate skeleton of a leaf, or a feather with its down, are impressed direct in all their delicacy, and the plate is ready to print from at once.

It was this fact which led me to the experiments which have resulted in the process I am now to describe, for on seeing the first specimen of a feather engraved by Mr. W. C. Aitken, early in 1852, I asked myself mentally, "If the down of a feather can be made to impress itself in a metal plate, and print, why not a drawing?" The next question was, "How to do it?" Urgent duties prevented any experiments until the winter of 1858. The result of these experiments I shall now give in detail.

No want has been more strongly felt in the arts than some easy, rapid, and direct method by which the spirit and mental impress of the artist's own hand could be reproduced in a metal plate, or type, either in intaglio or relievo. I remember reading, when a youth, in some old edition of the Life of Albert Durer, that he had solved this problem, and had a secret method, which died with him, by which he could transfer a drawing to a metal type and print from it. Whether this was simply a mystical description, by some person ignorant of art-processes, of the ordinary method of etching, in which Durer was such an adept, I cannot say, but it made a deep impression on my mind, and the question how to bring about such a result was for years a subject of interest and speculation with myself, as it has no doubt been to hundreds of others. When, in 1842, Mr. Palmer commenced his experiments in glyphography, some friend, knowing my propensity to experiment in this direction, sent him to me, and I believe I executed for him the first drawing produced by his process, in which lines were drawn in imitation of etching, or the *fac-simile* style of wood engraving. After several experiments, however, not seeing my way to satisfactory artistic results, I declined to devote any more time to this process. I have ventured to name this as showing that my attention was by no means first drawn practically to this question, when the success of the direct nature engraving of my friend, Mr. W. C. Aitken, in 1852, directed it into a new channel. In fact, every process of the kind had been practically examined and tested—etching on copper and steel, lithography, zincography, the anastatic process, the paneiconography of Gillot, shown in the Exhibition of 1851, from which so much was expected in surface printing, had all had attention. The matter was, therefore, not taken up blindly, except in one point, and that a most important one, for every single step of the solution of the problem had to be taken practically in the dark, as there was no experience in the same direction to suggest, still less to guide, in a single experiment; and even now, after four or five years' experience, I rarely make an experiment without gaining some additional light, which either helps the certainty or extends the operation of the process. I beg, therefore, most distinctly to state, that I do not bring this before you as a perfected process, but simply as a method which, so far as experience has gone, has produced certain undeniable artistic results, and as containing, as I believe it does, the elements of far higher, much wider, and more practical issues in the future. I trust no one will tell me that because the effects shown on this occasion are only produced in *intaglio*, that it would be much better for economical purposes to produce them in *relievo*, and thus suit them to the immense demand for surface printed illustrations. Of all this I am quite aware; but having so far accomplished one phase of the invention and undertaken to explain it, I shall confine myself to that. Should I, having already made a beginning, solve the other part of the problem, and produce a block where I now only produce a plate, I shall ask for another opportunity to bring that before you in due course. In the meantime our subject is the production of a metal plate engraved direct from a drawing and suitable to be printed from at an ordinary copper-plate printing press, or for transfers in certain industrial arts.

There are several methods by which the drawings can be made, but I shall confine my attention to describing and illustrating those which have been most successful up to this time. The material may be paper of suitable texture, such as fine India post, or sheet gelatine, or the drawing may be made on the surface of the plate to be engraved, or on the plate-glass bed of the machine.

When a drawing is made on paper there is a choice of two methods. One is to make the drawing with a glutinous ink, which when apparently dry, will, by floating it upon the surface of water, or damping equally at the back, become so far wet again as to take up fine particles of emery or other hard granular substances reduced to a powder. The effects produced are bold and effective, but rather coarse, as the examples shown indicate. The other method is to make the drawing with the same material as that used in executing a drawing on sheet gelatine, on the plate, or the plate-glass bed of the machine.

These drawings on paper when engraved produce a tint all over the subject, the result of the texture of the paper itself. This tint may be very usefully employed in producing gradations of tone, when treated with a mezzotinto scraper and burnisher.

The material for executing the drawings on sheet gelatine, &c., presented the greatest difficulty, and cost some hundreds of experiments. It is composed of peroxide of tin, peroxide of manganese, Indian or Venetian red, Paris white, rice starch, gum arabic, and bichromate of ammonia, the latter being used for the purpose of converting the gum and starch into an insoluble resin, so as to permit of the repetition of the touches of the drawing, without disturbing the work previously executed. The relative proportions of the ingredients of this drawing material, which requires special care and experience in its preparation, are given in the specification of the patent,* by which the invention has been secured, and therefore need not be quoted here, as, of course, modifications are made for the purpose of producing special effects, of which the practice of the art can alone show the use.

This drawing material is classified for use as No. 1, with which the outline and basis of the drawing is executed; No. 2, which is darker in colour, is used to re-touch parts requiring greater force than that produced by No. 1; No. 3 is sometimes used for producing very strong granular effects in the shadows, but generally I think it best to avoid its use.

One great peculiarity of this process is the production in the metal plate of the effects produced by broad washes and touches executed with a brush, somewhat of the character of aquatint. These broad effects are produced in the drawing by the washes being thrown in after the simple outline of the subject is obtained with material No. 1, by means of a special material, which, for convenience, is called Tint A, to indicate its use. A more granular modification of this mixture, Tint B, is used to obtain greater force in such parts of the washes as the artist may deem desirable.

* Patent No. 1,299, 1860.

The drawing instruments used are pens, metallic or otherwise, of suitable quality as regards fineness or breadth of point, and the ordinary sable brushes used in water-colour drawing.

When a drawing has to be executed, say on sheet gelatine, the material is selected of as even thickness as possible, and with the surface upon which the drawing is to be made free from spots, bubbles, or other blemishes, as these will come in contact with the plate during the operation of engraving, and all defects will be re-produced as well as the artist's work. The piece of sheet gelatine is mounted in a card board mount, the "sight" being cut to the size of the plate in which the drawing is to be engraved. (A specimen properly mounted was shown.) Over the back is placed a piece of tissue paper, fastened only on one side, so that it can be turned back, while the subject is traced upon the gelatine with the drawing material No. 1, from a study prepared for the purpose, and as the gelatine is as transparent as glass, of course this tracing can be done with the greatest nicety. The outline being secured, the piece of tissue paper is then returned to its position, and the drawing has much the appearance, when looked through, of being executed on ground glass.

To facilitate easy execution I have invented a drawing desk with a glass top fixed in a frame. This can be placed at any convenient angle, and by this desk being placed so that the artist can sit opposite to the light, with a piece of white paper on the bottom of the desk under the glass, the light is thrown through the partly executed drawing, and every facility is thus given for finishing it with all the force and effect of which the process is susceptible. (A specimen of the desk was shown in use with a lamp.)

The drawing materials, being in the condition of powder, are mixed for use by taking a small quantity of the gradation required and adding to it sufficient water to make it flow easily and continuously from the pen. If used too thin, however, the lines produced in the engraving are not forcible, and the principle of the invention must then be carefully borne in mind, viz., that the lines will engrave in proportion to their substance, just as the natural object engraves according to the thickness and density of its substance. In this fact lies the whole condition of a successful drawing, and perhaps I could not give a better illustration than by reminding the artist that, as in oil painting, the impasto, or loaded portion of the drawing is in the lights, the reverse is the case in autotypography, for the deeper the shadow required the higher the relief of the drawing material should be off the surface of the drawing, as the greater will be the intaglio thus produced in the plate. Of course it would be hopeless to attempt to give precise rules for producing special effects. We are dealing with an art, and to know it it must be practised; and I believe that it has this merit, that the impress of the mind and manual dexterity of the artist will add to the great charm of the results produced, whilst the limit, under certain conditions, is simply that of the ingenuity and skill of the executant.

The drawing being ready for engraving, which it is as soon as dry—that is a few minutes after it is finished, although as a rule it is better to let it stand for a few hours—it is taken to the machine.

The machine now before you is a working model of improvements suggested by the experience gained in the construction of one four times the size, and by which the larger specimens have been produced. This consists essentially of a pair of rolls mounted on horizontal axes. The bearings of the lower roll are fixed, whilst the brasses of the upper roll in which it turns are capable of a verticle sliding motion in the side standards. By means of side screws and hand wheels the upper roll is raised or depressed. In this small machine the wheels are engraved with gradual degrees for the indices of pressure, which can be regulated to the 1520th of an inch by the usual relation between the rotation of the index wheels and the thread of the screws. The edges of these wheels are notched or toothed in correspondence with the graduated degrees, and a fixed index with a spring engages as the wheels are moved, thus indicating both the pressure and parallelism of the upper roll with the lower. Between the two rolls a horizontal table or bed, which is supported by steel spring bars, is made to slide. The table may be made entirely of metal, but in this instance it is made of steel, with a well, into which a piece of plate glass is fitted and securely embedded upon a sheet of gutta-percha. The plate-glass possesses great advantages over metal, both as regards surface and non-oxydization, whilst the facility with which it can be removed, when required, from the well or metal frame for convenience in drawing upon is of great importance.

The rolls are made to revolve by means of a worm-wheel attached to the axis of the lower roll, but working outside the framework. Motion is communicated by a worm which drives the wheel, the power being applied to a hand-wheel or winch attached to the lower end of the worm axis or shaft, which works within a bearing and hanging bracket attached to the frame of the machine. The rotation of this shaft and worm communicates a slow and steady motion to the lower roll, and as this is geared on the opposite side to the upper roll by means of toothed wheels, the rolls rotate simultaneously.

The method by which a plate is engraved has now to be described. The thickness of the plate being gauged by one of Whitworth's decimal gauges, the indices are turned to the particular degree indicated by that thickness, with an allowance of the 50th of an inch, and the thickness of the gelatine, which may be calculated at another 50th, as engraving pressure. It should be borne in mind, however, that the gelatine is elastic and yields probably full one-half its thickness, so that the *plus* pressure beyond the gauge of the plate may be taken at about the 30th of an inch.

The metal plates used are a good quality of Britannia metal, and, so far as experience goes, these print a fair number; but by taking advantage of Joubert's process for steeling the surface, or producing an analogous effect by means of nickel, the plates yield a considerable number of impressions; and as the drawing is comparatively uninjured by the process, several plates of the same subject can be produced from one drawing by a careful examination of it, and a little retouching in such parts as may appear worn or deteriorated by the pressure in the operation of engraving. In some instances as many as six plates have been produced from one drawing, and it is still available, and, unless injured by damp or some accidental cause, will be available for years to come.

It will be evident, from the nature of the process, that it possesses several advantages over any other in use for the re-production of the artist's work direct from his own hand. Thus:—

1. There is no reversal of the subject required, as it is drawn exactly as it is to appear when printed.

2. A plate can be engraved and proved to show the state of the drawing. The latter can be worked in again, and again proved, and this can be repeated until the desired effect within the limits of the process is produced.

3. The transparency of the sheet gelatine gives great facility for copying drawings by tracing all the leading features; and, of course, this applies to photographs, which may be largely used as guides, and art thus made to supplement science, since the artist has the power of selection in reproduction of the forms of the photograph by autotypography.

4. The rapidity with which designs, drawings, &c., may be reproduced, when they are once executed by the autotypographic process, which, as already stated, becomes with a slight degree of practice, as easy as ordinary sepia or Indian ink drawing.

5. The fact that the artist can retain the plate in his possession, and have such a quantity printed at a time as

may best suit his convenience, as in the case of an etched plate.

In all the illustrations given it must be distinctly understood that no after process, or any retouching whatever, has been used. All the examples are the result of the autotypographic process, pure and simple. It must be quite clear, however, that some of the effects could be rendered much more positive and telling by judicious touching up with the graver and etching needle. As, however, it would have been difficult to have defined where the process which is the subject of this paper ended, and that of touching up began, it was thought desirable that none should be shown which had been so treated. It must be clear, however, that for practical purposes those well known means of increasing the force of an engraved plate would be largely available when required.

There are only two points now to consider, and this paper may be brought to its conclusion.

The first is—Can the process be regarded as complete? To this I answer, as the inventor, that so far as the effects already attempted are conceived it may be, but I feel satisfied that in the hands of an ingenious artist, fertile in resources as regards the production of delicate and even powerful effects, it is susceptible of very great development. This however depends upon one point, to which I am particularly desirous to have attention paid on this occasion in any remarks which may follow this paper, and that is, whether in the present advanced condition of the art of illustrative printing in its varied forms, this process is worthy of special attention and further development.

The second point is the purposes to which, if this question is settled in the affirmative, the process can be artistically and economically applied. Under the latter head we may range the reproduction of artists' sketches at a comparatively cheap rate, the plate being held for use at any period subsequent to the reproduction; also plates for book illustrations and the production of portraits in a metal plate by the aid of a photograph, the autotypographic drawing being worked upon from life if necessary. The portraits so produced are, of course, as permanent as those printed from ordinary engraved plates. In the industrial arts, the production of transfer plates, especially for the "bat" process for the decoration of porcelain, appears to afford a considerable field of operation, as the drawing produced by the original artist is reproduced on the ware; and outlines drawn by a first-class artist may be transferred to the surface of an article in porcelain, to be filled in with colour by the artist workman, whose technical knowledge is thus used to the greatest advantage. It must be evident, too, that metallic surfaces being planes, may be decorated in a novel and effective manner by painting upon the metal plate the design intended to be engraved, and then submitting it to the action of the machine. Results may be thus obtained which no engraving with a point could possibly achieve, and these effects may be further enhanced by working upon with the graver.

Of course it is impossible to calculate what ingenious persons may make of any invention at the outset. Experience has shown that the most unpromising in the beginning have come out triumphantly in the end; and it is equally true that many processes of apparently great value and probable usefulness when first developed, have sunk into oblivion before the test of practical and every-day application. Whether the process I have brought before the Society of Arts in this paper belongs to the one category or the other it would be presumptuous to pronounce too distinctly in its present stage. I may be allowed however to state, in concluding this description of its purpose and leading features, that the main object I have had in view in following up a series of experiments extending over more than four years, at no little cost of time and money, has been the improvement of the arts of my country both pictorial and industrial, by bringing the artist himself nearer to the reproduction of his own work, and affording a means by which the impress of the original mind and hand shall be conveyed in a permanent form, for easy reproduction in considerable numbers, at a comparatively cheap rate.

As a matter of interest to the members of the Society of Arts, I think it a duty, as it certainly is a pleasure, however largely mixed with sorrow, for me to state, that the late lamented President of the Society, His Royal Highness the Prince Consort, expressed a very distinct and favourable opinion of the process in its application to various branches of art when specimens were submitted to him, and a desire to know more of the practical working than could be given by mere description; but his premature removal from his earthly sphere of usefulness prevented the fulfilment of arrangements proposed for meeting his wishes. We all know the intelligent interest with which he invariably investigated all matters which seemed worthy of attention, or likely to prove useful to the arts and sciences of his adopted country, and his readiness to encourage, by kindly words and judicious advice, efforts which he believed to be in the right direction. To myself, although greatly encouraged by the favourable opinion expressed, it would have been a source of infinite satisfaction to have submitted the whole process to the judgment of one so able to appreciate its value on the one hand, or detect its defects on the other.

DISCUSSION.

The Chairman said he would not anticipate the pleasurable duty which would be required of him presently, of proposing their thanks to Mr. Wallis for his interesting paper. One of the advantages attending these meetings was the opportunity which they afforded of hearing the opinions of gentlemen who had more or less devoted themselves to the study of the particular subject brought under notice; and he was quite sure there were many gentlemen present whose remarks upon the process which Mr. Wallis had so clearly and earnestly brought before them the meeting would be very glad to hear.

Mr. John Leighton said that nature-printing, like numerous other processes, seemed destined to go through many phases before arriving at maturity; not but that it had effected many things ably and well since the Labyrinthodon left his foot-prints on the page of nature, imprinting them upon antediluvian sands for the edification of the savants of the nineteenth century. Mr. Wallis had successfully adapted the process to engrave even a wash of Indian ink, a thing he (Mr. Leighton) fully expected to find had been done before in Japan, as he had found that the process of enlarging and reducing engravings, introduced in this room a year or so back as a novelty, was already in existence there, as noted in Sir Rutherford Alcock's work, "The Capital of the Tycoon." He (Mr. Leighton) hoped that Mr. Wallis's ingenious process—which certainly had many advantages—would be fairly tried, and that artists would aid the inventor in carrying it out. The process seemed particularly suited for producing a limited number of prints. What the future of the invention would be he could not say; though, with the means already devised of giving the plates hardness without injuring that delicacy so important to be maintained, it seemed capable of great extension. He might mention that lace was nature printed, at Nottingham, some years prior to the Great Exhibition of 1851, and exhibited by Mr. Taylor, of that town.

Mr. Dickes said they must all feel greatly indebted to Mr. Wallis for the very interesting paper he had read; at the same time he might be allowed to call attention to the fact that the alleged Danish inventor, Kyhl, was not able to continue his invention, because at that time the other invention of electrotyping was not known. Had Kyhl possessed the means of giving strength to the plates by electrotyping, he thought the chances were that he would have been able to have rendered his discovery commercially valuable. The same difficulty had been touched upon by Mr. Leighton, and it would be interesting to

know whether, without electrotyping, Mr. Wallis had any means of making his plates lasting, and so of commercial value. Mr. Leighton had mentioned that lace-printing had been carried on at Nottingham many years ago. That was the fact: but prior to that the glyphographic process of Mr. Palmer had been brought forward in London. Mr. Palmer carried on his process not merely with intaglio plates, but also with surface plates.

The Chairman enquired at what date that occurred.

Mr. Dickes replied that he saw it about twenty-five years ago. He had never given the Austrians credit for the invention of the nature-printing process, but he believed what they had done in the matter might be traced to the information they obtained from such sources as Mr. Palmer and others.

Mr. Durlacher remarked that, as far as he understood the subject at present, all the advantages pointed out could be obtained by the ordinary process of lithography and transfer paper. The artist made his drawing on transfer paper, which was transferred to stone, and then printed from to any extent required. He did not see any great advantage to be derived from Mr. Wallis's process.

Mr. Wallis, in reply to the remarks of Mr. Dickes, said his plates did not require to be electrotyped. They were produced, as they had seen, direct from the drawing, and then printed from. A considerable number of impressions had been circulated in the room, and a thousand more might be worked off from the same plate. That plate had a nickel surface, and he was more indebted to Mr. Joubert's process for hardening the surface of the soft metal plates than to anything else. He was quite aware that if Kyhl had had the advantages of electrotyping, no doubt his ingenious invention would have been carried out long before, and therefore he wished to do full justice to the ingenuity of that individual, who, however, carried the discovery no further than the producing of metal plates of a soft character, and printing a few impressions from them. He (Mr. Wallis) wished the meeting distinctly to understand that his process was perfectly independent of electrotyping; at the same time it was not independent of the deposition of metals, because he was indebted to the steeling and nickeling process of Mr. Joubert for giving hardness to the surface of the plates, which were composed of Britannia metal, with a hard surface of steel or nickel deposited afterwards.

Mr. Papworth said, in reply to Mr. Durlacher, that it had apparently been forgotten that the best transfer suffered from the inevitable expansion of the paper, whilst the present process promised the fidelity which the artist could only now secure by himself etching a copper plate; and if the gelatine would not expand, no more trouble seemed to be involved than the making a careful drawing upon it. Mr. Papworth, after saying how much he was astonished and charmed with the results of the process exhibited, observed that it gave, in fact, a sort of aquatint plate, but it required one point of attention more than a common drawing, namely, that every touch must have an actual relief from the surface of the gelatine on paper, and therefore, if an artist did not succeed at the first or second attempt, he need not think that the process would never answer his ends. As many replicas of Rowlandson's drawings were in existence, he might explain at once how they were produced, and how Mr. Wallis's project was foreshadowed, by saying that Rowlandson made one sketch with thick ink, and had it passed over half-a-dozen other sheets in the printer's press, so that he could colour and sell the seven as originals.

Mr. Joubert said they were much indebted to Mr. Wallis for having brought before them his method of reproducing drawings in a very simple and expeditious way. It was a move in the right direction, and he judged of the progress which Mr. Wallis was likely to make when he saw the present results and compared them with those obtained twelve or eighteen months ago. The difficulty hitherto had been, to find the means of reproducing drawings or designs with materials already in use by the public, because any process based upon the use of new materials offered more or less difficulty. They must first become acquainted with the medium and acquire a certain amount of experience in it before they could bring the new process to bear, and in that respect Mr. Wallis had not been exempt from this difficulty, though he believed it was less than in many other processes. No doubt if, instead of gelatine, ordinary drawing paper could be used, it would be a very great advantage. When they looked at the extraordinary results of photography, if a means could be found of producing a copper or other plate which would give the photographed image in all its beauty and purity, it would be an invaluable discovery. Several processes had been attempted for producing that result. He had one of his own, which he had not yet matured, although he had produced specimens by its means. He thought no doubt could be entertained as to the commercial value of this process in the rapid production of fac-similes. Some years ago there was a great demand for rapid engraving for railway maps and plans, and such a system as this would then have been of great value. He had no doubt Mr. Wallis would turn his attention in that direction. Reference had been made by Mr. Wallis to the assistance he had derived from the process which he (Mr. Joubert) had described, in a paper read before the Society,* of applying a steel surface to an engraved plate, which, no doubt, would be an advantage in this case, especially as he could show that from a plate a little harder than that of Mr. Wallis, as many as 17,000 impressions had been taken. The difference between this and the processes hitherto known seemed to be in favour of Mr. Wallis's process, on account of the inexpensiveness of the materials, and there was also great advantage in the plates not requiring to be electrotyped. They had witnessed the rapidity of the process in what they had seen this evening, and the impressions circulated in the room appeared to be highly satisfactory, although done in a very hurried manner. He believed it was a very valuable process, and in perfecting it he hoped Mr. Wallis would receive from this Society, and from the public at large, every possible encouragement.

Mr. B. Waterhouse Hawkins (responding to the invitation of the Chairman) said he would have preferred to delay any remarks he should have been glad ultimately to offer, because his intimate acquaintance with the process, and with all Mr. Wallis had been doing for a long period of time, had supplied him with an amount of knowledge which, if he had made use of it, would only have been a repetition of what Mr. Wallis himself had so well said. He would, therefore, only allude to two or three observations which had been made since the paper was concluded. He thought the most striking remark that had been made—and he knew Mr. Wallis was most anxious to hear all that could be said on the subject—was that in which a comparison was drawn between this process and the ordinary process of transferring by lithography. He need scarcely allude to the grand difference between the two. Here was a process by which all the delicate gradations that could be given by an artist's hand, as the result of feeling, were reproduced with the utmost facility and certainty. They had the grain of the line and every gradation of tint. He was almost inclined to characterise the process of the ordinary method of transferring from paper to stone or zinc as an artistic abomination—the most unartistic thing that could be done—considering it was not possible by such means to make gradations in tint, and it was difficult even to make gradations in the thickness of lines so as to give variations in tint. He thought it was only necessary to make this passing allusion to the great difference in the results of this process as compared with lithography. The Chairman had alluded to the thanks that were due to Mr. Wallis for his labours in this direction. He (Mr. Hawkins)

* See *Journal*, Vol. vii., p. 15.

would say if the fine arts were the only object of this Society, it should bestow upon Mr. Wallis its highest commendation, from the fact that he had thus enabled the artist's thoughts to be reproduced with fidelity, and thoughts were not now too plentiful, nor the means of expressing them too abundant. The development of the photographic art had stimulated a taste for fac-similes of real objects. The old system of sketching, which was an indication of the mental operation of the artist, had been almost discouraged; indeed, it was out of date, because of the new relish that had sprung up for the re-production of actualities and realities in art, so that it was necessary to reproduce every fold in the drapery, which only encumbered the artist in the expression of his thoughts. If this process was a means of helping the true artist to express his thoughts rapidly, and to circulate them largely, they were much indebted to Mr. Wallis. But as the second object of the Society of Arts was to encourage all that increased commerce and aided manufactures, they must look a little further, and see whether they could not trace out a commercial application of Mr. Wallis's process. He (Mr. Hawkins) was aware, from his own experience in the matter, that it was applicable to the higher class of decoration of porcelain. They must all remember with great delight the charming character of the Raffaellesque ware, in which they remarked the hand of the great artist who condescended—if it could be termed a condescension—to bestow some attention to that class of work, but, thanks to Minton and others, who had of late turned their attention to this subject, they found again a desire and good-will on the part of the artist to combine the work of the hand and of the mind upon objects of every-day use. Here, again, arose the difficulty of producing such articles combining high artistic excellence with economy of production. To this end there must be a certain power of reproduction, or such works were not brought within the means of the public at large. This process afforded every facility for transferring to objects of utility the actual impress of the artist's mind, his living thoughts; and if such manufacturers as Copeland, Battam, and others would undertake the application—and he knew how much good-will there was for all such experiments—he was sure they would find this process applicable for the adaptation of high class designs to objects of every-day utility.

The Chairman said he now came to the very agreeable duty of proposing a vote of thanks to Mr. Wallis for his paper. He was quite sure, from the interest with which it had been listened to, all present felt their obligation to that gentleman, not only for the value of the information he had given, but also for the clear manner in which he had illustrated his process in their presence. Mr. Hawkins had spoken so ably, and had covered the ground so fully, that he believed the meeting would respond to all that had fallen from that gentleman. The mere question of the relative value of this process, compared with others, was an interesting one; but neither could this invention, on the one hand, take away from the merit of former ones, nor, on the other hand, could any comparison diminish their gratitude to Mr. Wallis for having worked out his process in the careful, and, as he apprehended, expensive manner he had done. All these processes, which had been so ably traced in the paper, were valuable as having led from one thing to something beyond. The progress of all science had been made by steps, and they knew how much one step in advance depended upon that which preceded it. Mr. Wallis, in the introductory portion of his paper, had given them an interesting account of the different inventions or processes carried out by Sturges, Branson, Worring, and others, and was disposed to think that none of them had heard of the process of Kyhl, inasmuch as he had not been able to carry out his invention, and it was supp sed it had been forgotten. He (the Chairman) did not know whether Mr. Wallis had a right to assume anything of the kind. If the invention of Kyhl was deemed of sufficient importance to be placed upon the archives of Copenhagen, the subsequent experimenters would no doubt have heard of it; but that did not detract from the merit of other inventors. It had been remarked that "invention is but memory half forgot," and it was astonishing how slight a hint would sometimes have a powerful influence upon an impressible mind. Some minds might work through a lifetime without receiving a single impression, whilst other minds were so constituted that they received and retained impressions from everything that passed around them, and long after, when these impressions might seem to have been forgotten, the divine quality of the mind would reproduce and apply them. Still, however, it was often the case that two minds might have conceived the same thing. They would recollect the passage in the "Critic," in which an author, on being charged with some little plagiarism, replied—"Two great men may have the same great idea; but Shakspeare had it first." Two minds, whose studies and tendencies worked in the same direction, might easily arrive at the same results, without being indebted to each other; but still it was often the case that a process of which the first inventor had only given the slightest hint, was seized upon by a congenial mind at a future time and carried into practical effect. Therefore, although he believed these Birmingham gentlemen were not indebted to Kyhl, he thought it probable the experimenters at Vienna had some knowledge of what had previously been done at Copenhagen and elsewhere. As Mr. Wallis had said, no doubt the Birmingham inventors were too much occupied with their own pursuits to be able to inquire into the experiments made in other countries, but he thought it probable that what was done elsewhere was known at Vienna by men who devoted themselves to scientific studies. In the "Century of Inventions" there were many things vaguely shadowed forth which had since been practically realised. It was most curious to remark the manner in which, in the writings of early days, things were hinted at, almost in a prophetic spirit, which had since been realised. Thus Shakspeare spoke of putting a girdle round the earth in forty seconds. That had been accomplished by the electric telegraph. It was impossible to go through all the instances of this; but a very interesting French work on this subject had been published, in which they would find the germ of almost every invention of the present time hinted at, as if there were certain minds so constituted at certain periods, so divinely formed, as to prepare the world for the great discoveries of after times. Therefore, he said, they must not underrate Kyhl's invention, because he might have been, without their knowing it, the real originator of the process for which Mr. Wallis deserved the credit. Albert Durer was supposed to have discovered something of the same kind. Mr. Wallis thought it a mere fancy, but he (the Chairman) did not believe in fancies in matters of this kind. In the life of Della Robbia, it was stated that he was in possession of a secret process for the preparation of the material for his models, which were remarkable for their great beauty, and hat he would not divulge that secret during his lifetime; but in order that it might not be lost after his death, it was buried within one of his works. All his works were in terra cotta, so that if it was found at all, it could only be done by breaking up all his models. They might break the last one before they got it; and it might then be found that Minton had been doing the same thing, for a number of years, much better than it was done by Della Robbia. To come back to the process more immediately under consideration, he would remark that he did not like the term "engraving" as applied to it. The engraver would say, "I know nothing about this process." It was not engraving, but the most beautiful process of transfer he had ever seen. It resembled the transfer for lithographic purposes in its principle, but, as Mr. Hawkins had explained, there were great differences in the results obtained. It was literally a transfer throughout, first, of the artist's mind and feeling

to his drawing, and then that drawing was transferred to the plate and could be multiplied to any extent. It was a transfer from the artist himself to the public, and there was no intermediate process by which the work might be spoilt. Mr. Wallis had very modestly said he did not consider he had yet brought his process to perfection. He (the Chairman) would be sorry if he had. He did not believe so beautiful a process could be brought to perfection in a short time; but they were indebted to Mr. Wallis for having opened the door so wide and so well that it could not be said the process was only in its infancy, for he had arrived at a means by which an artist's work could be reproduced precisely as he gave it forth. The question that had occurred to him (the Chairman) in hearing the description of the process was whether the extreme smoothness of the surface of the gelatine paper would not affect the value of the drawing. He also apprehended the size of the pictures would be limited to the size to which the gelatine could be pre pared. Mr. Leighton had asked the question, whether Mr. Wallis would be prepared to execute these works for artists and amateurs. There came another question, on which he should like to hear the opinion of Mr. Wallis—viz., whether it was possible—and he believed it to be so—to make the drawing upon a more agreeable medium than gelatine, something with a little more grain in it, and if Mr. Wallis did not succeed it that respect, he had no doubt, when the process was better known, somebody else would. All these considerations were so many steps towards the perfection of the process, and he had no doubt would ultimately lead to most important results. He now begged to propose that the cordial thanks of the meeting be given to Mr. Wallis for his valuable and interesting paper.

The vote of thanks having been passed,

Mr. Wallis, in acknowledging the compliment paid to him, said the subject had been discussed in so kind a spirit that he felt bound to thank those who had criticised him, for he believed out of this much good would come. He quite agreed with the Chairman that it was highly probable that others would succeed in making this process more valuable than it now was. There were many points which he saw were desirable, and which time might enable him or some one else to effect. With regard to the question of the size of the pictures being limited to the size of the gelatine paper, of course that would be so, but he had been assured by an eminent maker of that article, in Paris, that he could prepare it to any reasonable size at a small extra cost, and perfect as regarded the surface, so that there would be no practical difficulty on that score. With regard to the commercial part of the question, to which Mr. Leighton had referred, he might say he hoped to make such arrangements as would enable him, or some trading firms who took the matter up, to receive drawings from artists and amateurs, to be transferred to the plates, by whom also the materials for the drawings would be supplied. When the plate was produced from the drawing a proof impression could be sent to the artist for alteration or improvement, and again sent back and reproduced, after which any number of impressions required could be worked off, either for the purposes of the artist or for the illustration of books which would not bear the expense of engraved blocks. He felt much indebted to his friend Mr. Waterhouse Hawkins for his remarks in comparing this process with that of lithography. He was prepared to admit that the advances in that art had been most wonderful; but it still required the aid of a specially educated artist to carry it out in the best manner. His own purpose was to meet the artist upon his own ground, and to produce a process by which he would be enabled without further trouble to himself to reproduce drawings without the intervention of others. It was not intended to enter into competition with any of the existing processes. Each process had its value, and each would no doubt keep its position, but when they considered the amount of skill required to make a good lithographic draughtsman, the superiority of the present process would be apparent to everyone present. Supposing Barry had had the advantage of this process in his etchings of the famous pictures round that room, he could have executed his work without the necessity of such a large amount of labour, and the effect would have been more satisfactory. He had said only thus much, because he felt that his friends had defended all the other points to which exception might be taken. He was conscious there were still many defects in the process, and that a great deal more remained to be done. So far from being satisfied, he was at times very much the contrary. He felt the process was capable of better things. Whether he, himself, would bring it to perfection, or whether this would be done by others, he could not say; but if his health were spared, and he had the means, he would try. The deep interest in the subject which had been evinced this evening was an ample reward to him for the trouble he had taken in bringing the matter before them.

Illustrative experiments were carried on during the reading of the paper, and the delivery of suitable incidental explanations. These experiments consisted of engraving a plate from a drawing of a figure of "Autumn," specially designed and executed by Miss Leila L. Hawkins, who has very successfully practised the process. This operation occupied a few minutes, the actual engraving or impressing of the plate not taking more than four or five seconds. Impressions from the plate, after it had been washed with water, to remove any portion of the drawing material which might have adhered, were taken at a copper plate printing press, and distributed among the audience, as also impressions from a drawing of a device, designed by Miss L. L. Hawkins, in commemoration of the marriage of the Prince and Princess of Wales, in which the auto-typographic process was used for the figures of Cupid and Hymen supporting the Prince of Wales's plume, which was engraved from three feathers, as an illustration of the direct process of nature printing. A design for the back of a playing card, executed by Mr. Andrew, but only partly finished, was also engraved and printed. This also showed the application of the process to the ornamentation of metals. Mr. G. M. Atkinson and Mr. J. Le Resche having kindly undertaken to execute drawings on the spot, a plate was engraved from a sketch executed with the brush by the former gentleman, from the figure of King Alfred in the "Elysium" of Barry, which adorns the great room of the Society of Arts, in which the meeting was held. A sketch, with a pen, of a cairn in the Isle of Man, by Mr. Le Resche, was not engraved for want of time. Illustrations of the practical application of the process to ceramic decorations, in the style of the ancient Raffaelle ware, were shown, the transfer plates having been engraved from designs and drawings by Miss Leila L. Hawkins, who had filled in one of them, as the decoration of a tazza, with colour. Mr. Battam, of Gough-square, Fleet-street, has kindly undertaken a series of trials for this purpose.

The Secretary announced that on Wednesday

evening next, the 22nd inst., a paper by Capt. T. E. Symonds, R.N., "On the Construction of Twin Screw Steamships," would be read.

ARTIFICIAL ILLUMINATION.

Dr. Frankland, in a lecture lately delivered at the Royal Institution, in speaking of the discoveries and improvements connected with gas as an illuminating agent, said, "It is of great importance that gas, as a light-giving material, should be improved to the greatest possible extent, so as to make it a perfect source of light. Its conveniences are so patent to every one, its use is attended with so few discomforts, and the light is obtained with such facility, and of any desired intensity within certain limits, that there is, perhaps, no source of artificial light capable of such general application. Nevertheless, this is one of the modes of illumination which, having been long previously in use, have not made great progress during the past ten years. The sulphur compounds, which at the commencement of that time were complained of as being present in purified gas, are still there in considerable, if not in undiminished, quantity, although there has recently been a process devised by means of which these impurities can be, to a great extent, got rid of. It remains to be seen whether this process be applicable, on a large scale, in the gas manufactory; but, so far as can be judged from experiments made upon a small scale, it is a process which is likely to be very effective. It is the invention of the Rev. Mr. Bowditch, of Wakefield. These sulphur compounds are irremovable in the ordinary process of purification. The gas may be passed in the usual manner over hydrate of lime, or the peroxide of iron; but this operation does not, in the slightest degree, affect the sulphur compound in question. During the combustion of the gas, however, their sulphur is converted into sulphurous acid, which diffuses itself in the apartment in which the gas is burned, and a great deal of the discomfort of which many complain in the use of gas is due to this cause. Mr. Bowditch discovered that though cold hydrate of lime will not remove these impurities, they are to a great extent got rid of by heating the hydrate of lime to a temperature varying from the boiling point of water up to 400° or 500° Fahr., a temperature of 400° being the most effective for the development of the effects of his process. The heated hydrate of lime converts the sulphur compound into sulphuretted hydrogen and carbonic acid, which can then be removed by the ordinary purifying material—cold hydrate of lime. This process has been found by repeated experiments to remove all but about two or three grains of sulphur per 100 cubic feet of gas, the quantity of sulphur originally contained in the gas varying from five to six grains up to 20 grains in 100 cubic feet. Heated hydrate of lime was shown to develop sulphuretted hydrogen from the gas supplied to the Institution.

"Another recently ascertained fact in connection with gas is the discovery of a new illuminating constituent recently made by M. Berthelot. This is a gaseous body, called Acetylene, which is produced under very peculiar circumstances. Unlike all other hydrocarbons with which we were formerly acquainted, an intense heat is favourable to the production of this body. For instance, it is produced when coke is very intensely ignited in hydrogen gas; and Dr. Odling has recently demonstrated that two of the constituents of coal gas, light carburetted hydrogen and carbonic oxide, which are useless for lighting purposes, may, by means of strong ignition, be made to form acetylene, and thus become luminiferous agents. It has generally been considered important to preserve a moderate degree of heat in gas-making, in order to prevent the destruction of the luminiferous hydrocarbons; but the discovery of the formation of acetylene, under the circumstances named, will render it necessary to investigate how far the production of this substance can be carried on upon a large scale, and rendered valuable for increasing the illuminating power of gas. The subject is yet in embryo; but it has an important bearing upon the future progress of gas-lighting. Acetylene and olefiant gas contain, in equal volumes, the same amount of carbon, but the former contains only half as much hydrogen as the latter; consequently, the illuminating power of acetylene is probably at least double that of olefiant gas.

"The compound of acetylene with copper, is a substance not altogether devoid of interest to the gas-manufacturer. When it attains a certain heat, it explodes with considerable violence, and the same effect may be produced by friction. It has been demonstrated recently, that acetylide of copper can be produced by the passage of ordinary coal-gas, containing, as it does, a trace of ammonia, through copper or brass tubes; and explosions which have taken place through cleaning out such tubes, resulting in serious injury to workmen, have been doubtless due to the presence of this substance. It is, of course, obvious that an explosion of this kind, even if slight in itself, may be communicated to explosive mixtures of gas and air (in a gas-holder or gas-meter, for instance), and may thus lead to very disastrous results. An explosion of this kind occurred a few years ago in Lancashire. A large meter had been detached, and brought into the open air; a workman was unscrewing one of the brass connections, when the meter exploded with a loud report. The explosion could not be accounted for, as all the eye-witnesses were positive that no ignited body of any kind was near the meter."

The improvement effected in the production and application of oils for illuminating purposes were next referred to.

The animal and vegetable oils, which for ages have been employed for this purpose, have received no development of importance during the last ten years. On the other hand, new sources of this class of illuminants have been discovered, which threaten to produce a great revolution in the modes of obtaining artificial light.

SUGAR CULTIVATION IN NATAL.

The following is extracted from the *Natal Mercury*, of January, 1863:—

One of the most interesting incidents connected with the progress of this product is the erection of the first vacuum pan introduced into the colony. This is the highest development that the art of sugar manufacture has attained, and even in Mauritius the number of estates possessing this appliance is only a small percentage of the aggregate. It unfortunately happens that the utility of vacuum pans to the planter is very much diminished by the differential duties, levied on a high class article in England, compelling the producer, in self-defence, to turn out a low quality of sugar. During this year another still later improvement in sugar making will be tested, and the gentleman who has had the enterprise to essay the experiment will, we hope, find the new plan answer his expectations. There have not been many new mills erected since our last review, and a few changes of proprietorship have occurred. It is a sound indication that those who are most hopeful about sugar planting are those who have been the longest time engaged in the enterprise. When we see old colonists beginning to plant sugar we may assume that the occupation is a paying one; and when we see men who have been planting sugar for six or eight years extending their operations, and renewing their efforts, we naturally conclude that they are more than satisfied with the calling they have espoused. Natal has some difficulties to contend with, but we feel convinced she will become a large sugar yielding country. We say this after personal observation in the Mauritius, and after

personal communication with sugar growers in different parts of the world. The increasing demand for home consumption reduces the export of the article, and the Customs Returns are not therefore a fair reflex of production. Two cargoes, however, besides many large shipments, have been made, although we do not anticipate that the annual export will be larger, if so much, as the previous year. This year, on the other hand, we may look forward to a considerable increase.

PREPARATION OF ALCOHOL FROM COAL GAS.

The following is extracted from the *Chemical News* :—

When we first saw in the newspapers the announcement that "a young French chemist had discovered a process by which alcohol could be made from coal gas with an economy of 60 per cent. over the methods now in use," we confess we felt proud of being connected, however humbly, with a science capable of such marvels.

Knowing what had been done for the chemistry of the alcohols by men bearing such names as Hennell, Liebig, Dumas, Gerhardt, Wurtz, and Berthelot, not to mention a host of others, our feelings gradually merged into surprise, that it should be reserved for an unknown name to acquire such lustre at one leap. Nevertheless, so authoritative was the announcement that we did not question the fact, but patiently awaited the unveiling of the mystery. Our readers will guess our chagrin when we found that the process was not only not new, but that it was only an attempt to apply in practice the method foreshadowed by Hennell and realised by Berthelot. That it was, in fact, to hydrate olefiant gas by the agency of sulphuric acid.

That sulphuric acid is capable of fulfilling the paradoxical functions of hydrating olefiants, and yet of dehydrating alcohols, according to the conditions of the experiment, we at once admit; and we doubt not that by operating on a sufficiently large scale, alcohol might be prepared by a modification of Berthelot's process in quantity; but that it could be done with an economy of 60 per cent. over the methods at present in use we do not for an instant believe.

Unfortunately the process is not one the economy of which can be tested with the ordinary resources of a laboratory, and we can only therefore found our judgment upon the evidence afforded by the published specification.

M. Cotelle, the patentee, employs several modes of producing intimate contact of coal gas with the sulphuric acid. The first is by means of a pump to discharge the acid in the form of rain into a leaden receiver containing the gas, the second is a more complex method of operating, but on the same principle. The third is to procure absorption by pressure, as in preparing soda-water, and the fourth consists in placing the sulphuric acid in the form of vapour in contact with the gas. The details cannot be given without engravings, and we must therefore refer those of our readers who desire to study the process to the patent.*

The patentee assures us that "except losses which can never be prevented in great concerns, the sulphuric acid that is employed may serve almost indefinitely." To carry out this, it is proposed, after diluting the acid which has combined with the olefiant gas, to distil it to obtain the alcohol, and then to concentrate the diluted acid to the strength required to enable it to act on fresh quantities of gas.

We do not for a moment deny that by proper management of the absorptive apparatus the olefiant may be dissolved in the acid, but we greatly doubt whether more than a very small portion of the dissolved gas becomes converted into alcohol on subsequent dilution. Moreover, we conceive that on concentrating the acid much loss will be incurred, owing to formation of sulphurous acid from the carbonaceous matters, which are, we think, sure to remain with the acid.

The cost of the fuel required to concentrate the highly diluted acid to a state fit for operating on fresh gas will also be considerable.

When we consider also that it will be necessary to have pumps unceasingly at work with sulphuric acid of the strength known as pan acid, and of a density therefore of about, 1·767, it must be admitted that "wear and tear" of machinery will be a not unimportant item in the expenditure of the "Company Cotelle."

Taking the above objections only, and disregarding the prejudice which will certainly be felt against the employment of coal gas spirit for any thing but manufacturing processes, we must admit that we have no faith in the practical utility of M. Cotelle's patent. The specification, moreover, shows no ingenuity; the modes of procuring contact between the acid and the gas are merely those which would suggest themselves to any one giving even a very small amount of attention to the subject, and they constitute the only part of the patent upon which M. Cotelle had the opportunity to exercise his talents, inasmuch as the chemical part of the process had been done previously by others.

Some of our friends have felt alarmed lest to their numerous delinquencies wine merchants should add yet another—the sophistication of wines and spirits with M. Berthelot's hydrated olefiant gas. Let them be tranquil, the chances of such an adulteration being profitable, at least for some years, are very remote.

* 1862, July 19, No. 2,062.

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS.

At the last ordinary monthly meeting of the Executive Committee of this Association, held at the offices, 41, Corporation street, Manchester, on Tuesday, February 24th, Hugh Mason, Esq., Vice-President, in the chair, Mr. L. E. Fletcher, chief engineer, presented his report, embracing the month of January as well as that of February. The following is an abstract :—

During the last two months, *i.e.*, from January 1st to February 20th, the ordinary visits of inspection have been made, two boilers tested by hydraulic pressure, and the following defects discovered in the boilers examined, viz. :—Fracture, 4; corrosion, 45 (5 dangerous); safety-valves out of order, 8 (1 dangerous); water-gauges ditto, 28 (2 dangerous); pressure-guages ditto, 19; feed apparatus ditto, 9; blow-out cocks ditto (mainly from neglect), 37 (1 dangerous); fusible plug ditto, 1; furnaces out of shape, 3 (1 dangerous); blistered plates, 3. Total, 157 (10 dangerous). Boilers without glass water-guages, 10; without blow-out cocks, 17; without back-pressure valves, 64.

EXPLOSIONS.

Another death has resulted from the explosion which occurred to the iron-works' boiler referred to in the monthly report for December last, thus making in all 11 deaths from that single explosion, while, in addition, 25 persons were injured.

Three explosions* have been reported since the commencement of this year, from which, however, no lives have been lost, nor any personal injury done worth mentioning. Not one of the boilers in question was under the inspection of this Association. The following is a tabular statement :—

* Since this was in type, another explosion of a very fatal character has occurred. Engineering particulars as to the construction of the boiler and cause of the explosion will be given in the next monthly abstract, the explosion having happened on February 23rd, while the present report closed on February 20th.

FROM JANUARY 1ST, 1863, TO FEBRUARY 20TH, 1863, INCLUSIVE.

Index No.	Date.	GENERAL DESCRIPTION OF BOILER.	Persons killed.	Persons injured.	Total.
No. 1.	Jan. 12th	Ordinary double flue, or "Lancashire." Internally fired.	none.	none.	none.
No. 2.	Feb. 6th	Plain Cylindrical. Externally fired.	—	—	—
No. 3.	Feb. 7th	Plain Cylindrical. Externally fired.	—	—	—

No. 1 Explosion.—There has been no opportunity o investigating the cause of this explosion, neither have any reliable reports been obtained, but with regard to No. 2 and 3 a personal examination has subsequently been made of the boiler in each instance.

No. 2 Explosion.—The boiler in this case was externally fired, and of plain cylindrical construction, the ends being slightly domed. The length was 5 feet; the diameter, 2 feet; and the thickness of the plates, $\frac{3}{8}$ths in the ends, and $\frac{1}{4}$ in the remainder. The cylindrical portion of the shell was composed of two plates, about three feet wide, laid lengthwise, and flanged at their attachment to the end plates, which were in one piece. The complement of fittings was most incomplete, the number of those omitted being greater than those supplied. There was no feed stop-valve, no feed back-pressure valve, no steam pressure-gauge, nor any tap for applying the indicator as a test of the actual pressure. The only fittings were, one glass water-gauge, and one safety-valve, the latter stated to have blown off at a pressure of 25 lbs. to the square inch.

The boiler had lately been purchased second-hand, and not put into regular work since its re-setting. In consequence of this, the feed-pipe was not yet connected, and the boiler had been supplied with water poured in by hand at the safety-valve when the steam was down. The engine was standing at the time of the explosion, but had been working about an hour previously.

The results of the explosion to the surrounding property were, that the workshop in which the boiler was set was laid completely in ruins, the chimney levelled to the ground, and the windows of a house on the opposite side of the street broken by the concussion. The boiler was rent into five pieces, one of which was blown across the street, and lodged upon the top of the opposite house, while the manhole cover was thrown upon the roof of a shed in another direction.

With regard to the cause of the explosion, the primitive mode of feeding the boiler naturally excited suspicion as to the sufficiency of the supply of water; and with this view, therefore, a particular examination was made of the remaining fragments of the glass water-guage, the colour of the plates, and the position of the fractures; in addition to which, the circumstances attendant on the working of the boiler were inquired into. The result of this investigation was, that shortness of water did not appear to have been the cause of the explosion, and this conclusion was corroborated by further examination, as will be seen from the following particulars.

The safety-valve, which was supposed to have blown off at 25 lb. pressure, was found, on investigation, to have been loaded to upwards of 100 lbs.; the diameter being one inch, the proportions of the lever thirteen to one, the weight at the end 5 lbs., in addition to that of the lever itself. It is impossible to say, however, whether the valve had been free or not, since it, as well as the lever, had been blown away; and as there had been no steam-gauge, the pressure must always have been a matter of uncertainty, and thus it can only now be concluded that 100 lbs. on the square inch was the minimum.

A boiler, however, of such dimensions as the one in question would, if well constructed, withstand a much higher pressure than that of 100 lbs. per square inch; but, in this case, the manhole had not been strengthened with any mouth-piece, and consequently made a very weak point in the shell, from which the explosion appeared to have arisen. Five rents had started from it, while the remaining fractures were all subsidiary to these, and nothing more than the simple development of them.

The effect of the manhole would be to throw upon the plates of the shell, in the immediate vicinity of the opening, an extra disruptive strain of about 10 tons, added to which, the cover being an internal one, there would be acting upon it an upward pressure of steam amounting to about five tons, and tending to drive it through the manhole. The cover was a bad fit, being much too rounding, in consequence of which difficulty had always been experienced in making the joint, and it had been severely tightened by a stout bolt, which left the impression of the heels of the bridge in the plates. When it is remembered that the thickness of the plates was only $\frac{1}{4}$ of an inch, it will not be thought surprising that fracture should have occurred at the manhole, under the above circumstances; and the fact of five of the rents emanating from this point, and all the others being explicable upon the view that fracture commenced there in the first instance, it is thought to be conclusive that the mal-construction of the boiler, in not being suitably strengthened at the manhole, was the cause of the explosion.

The proprietor of this boiler had just purchased it, in addition to a small engine, with a view of increasing his business, but has not only lost the savings he had thus invested, but involved himself with regard to the surrounding property; an illustration of the false economy too frequently practised with regard to boilers, as well as of the risk to which lives may be exposed, though unintentionally so, when, as in the present instance, such ill-appointed boilers are worked in the heart of a populous city.

No. 3 Explosion.—The circumstances in this case were very similar to those in No. 2. The boiler was externally fired, and of plain cylindrical construction. The length was 7 feet 6 inches; the diameter, 3 feet; while the plates varied in thickness from $\frac{4}{16}$ths to $\frac{1}{4}$. The boiler was made out of an old flue-tube, taken from an internally fired boiler, and the longitudinal seams were in line. The fittings consisted of only one float, and one safety-valve, there being, as in the previous case, no steam-gauge, nor any means of ascertaining the actual pressure. At the time of the explosion the engine was not at work, but the steam was being got up in preparation for starting, and the boiler was stated to have been amply supplied with water, which an examination of the plates and fractures, afforded no reason to doubt.

As to the cause of the explosion, there could be no room for hesitation. The safety-valve, which was stated to have blown off at 50 lbs. pressure, proved to have been actually loaded to upwards of 200 lbs., the diameter being only three-quarters of an inch, the proportions of the lever, seven to one, and the weight with which the lever was loaded, 21 lbs. The manhole in this boiler, as in the previous one, was not strengthened by any mouth-piece, and the rents, as before, had started from this opening.

Attention has already been called in these reports* to the weakening effect produced upon the shells of boilers by unguarded manholes, as well as by openings cut in the plates at the base of steam domes, and a case of explosion from these causes previously recorded.

All modern well-appointed boilers have, as a rule, their manholes strengthened by strong mouth-pieces rivetted to the plate, the surface for the cover-joint being

* *Vide* Annual Report, 1861, p. 81.

fused; still, it is thought that the weakening effect produced upon the shells of boilers by steam domes has not, as yet, received sufficient attention, and although it may have proved hitherto comparatively harmless, that the gradual increase of pressure, now generally taking place, must shortly force the subject into notice, and thus prominence is given to the details of these two explosions with a view of showing the importance of the subject. The danger of working without steam pressure-gauges will also be apparent from both of the above explosions.

The results of this explosion were curious rather than serious, and attested the force of atmospheric concussion produced by steam. A dwelling-house directly facing the boiler, and situated about 50 feet from it, had its four windows, two on the ground floor and two immediately over them, all dismantled. A shower of bricks had been projected through the lower window immediately opposite the boiler, and had left their scars upon the walls of the room inside, while the two upper windows were also blown in. This will not excite much surprise; but the other lower window was stated not to have been blown in but drawn out, and this was attested by the debris of the sash lying upon the ground in the yard, while it was added that a looking-glass standing in the room had been sucked out along with the window-sash, and thrown upon the ground outside.

The same apparent anomaly has been noticed with regard to explosions caused by gunpowder, some objects being thrown away from the seat of the explosion, and others drawn towards it. This is accounted for by the double action that takes place, namely, first an expansion, which causes pressure, and then a recoil, which produces exhaustion. Some objects are more susceptible to the effect of pressure than exhaustion, while others are the reverse, and each succumbs to that action to which it is able to offer the least resistance. Thus, unguarded windows fall under the first action—viz., that of pressure consequent upon the expansion, while outside shutters, adapted to resist external aggression, withstand the former, but yield to the exhaustion consequent upon the recoil.

There were further signs on the roof of an adjoining shed of the force of atmospheric impact, consequent on the explosion. This shed stood at right angles with the dwelling-house, and extending toward the seat of the boiler, formed, with the buildings immediately adjoining the latter, nearly three sides of a square. A considerable portion of the side of this shed nearest the boiler was open, while the other sides were closed. The effect upon the shed was, that many of the stone flags, with which the roof was covered, were blown up, and, clearing the pegs which hung them to the rafters, slid down upon the lower ones, while others mounted the rafters only and there remained. The portion of the roof affected was the side of the gable opposite to the open doorway, and most distant from the boiler, since that side presented a surface more nearly at right angles with the direction of the impulse than the other. These particulars, though not important in themselves, afford, it is thought, additional evidence of the high pressure at which the boiler must have been worked.

In conclusion, no cases of such excessive pressure, as those given in the report above, have ever before come under my observation; and I trust that it will be seen, from the results which followed, what an engine of danger an ill-appointed steam boiler may become; and also, how seriously the shells of boilers are weakened by gashes cut in their plates, either at manholes when unguarded by substantial mouth-pieces, or at the base of steam domes; and I would recommend that all boilers should be fitted with a steam pressure-guage, and those working separately, with a duplicate safety-valve.

Home Correspondence.

FIRE ENGINES.

Sir,—A letter having appeared in your last impression impeaching the statements made by me in a paper read before the Society of Arts on the "Suppression and Extinction of Fires," I beg to inform your readers that the table of results of actual public trials of steam fire-engines is not "a digest" of any individual's "official report," but are from notes taken by myself at Hodges' Distillery, Lambeth, on the occasion of every public trial that has taken place there, including others elsewhere which I have attended.

I have carefully compared these results, and have noted in the table the best performance of every engine, in compiling which it was my endeavour to act fairly and impartially. My success was, I think, proved by the courteous and attentive manner in which my paper was received by all the engine makers who were present at the meeting on March 18th.

I beg, therefore, to maintain the correctness of my table.

I am, &c.,

CHARLES B. KING, M.E.

30, Abingdon-street, Westminster, April 14th, 1863.

STREET ILLUMINATIONS AND DECORATIONS FOR FETES.

Sir,—I have read with much satisfaction Mr. H. C. White's letter in the last number of the *Journal*. I am at a loss to conceive what good purpose can be served by the appointment of the proposed committee; on the contrary, I am of the opinion that such a course of action is at variance with, and derogatory to, the functions of a body such as the Society of Arts.

I trust the Council will pause before they finally enter upon this question, and that a strong feeling of disunity with such a proceeding will be manifested by the members generally. I am, &c.,

GEO. L. NEIGHBOUR.

127, Holborn, April 8, 1863.

Sir,—With reference to street illuminations, two things are necessary—it is the only way (in large cities especially) of finishing with *eclat* a public day of rejoicing, and it is the only means of diffusing an instantaneous and popular knowledge of any great national joyous event; not one in a thousand of the populace who are aware now that our future king, the eldest son of Albert the Good, was married on the 10th of March last—and these passages in our history ought to be marked—would have known it but for being enlightened on the subject by the illuminations, bonfires, torch-light processions, and fireworks, which that night lit up the whole country. Bonfires, torch-light processions, or fireworks cannot be allowed in the streets of our cities, but good illuminations can; and although we have far surpassed the time when George the Third's jubilee was held, and the streets were illuminated by oil lamps, or candles stuck in clay candlesticks, and here and there a transparency or a loyal motto punched out in card board, with a few candles behind it, yet there is much more room for improvement; we have now gas in addition to oil lamps, and brilliant cut glass drops, all at our disposal, and all suitable in their place. The noble façade of the Royal Exchange has been repeatedly and properly illuminated with oil lamps, and I hope will not be altered, either in the text or manner of display, for generations to come. The National Gallery appeared on the late occasion splendid in its brilliants, and the Admiralty in the display of gas. There will always be a diversity of feeling as to illuminations, while there will be also emulation and bits of humour, which add a zest to the affair. At future rejoicings, illuminating the centre of our west-end squares would tell very effectually, and relieve the streets; and were there fireworks also in the park, it would be a most acceptable addition. W

must collectively have our outburst of feeling, and I am glad to see your Society have appointed a committee to inquire how these popular rejoicings can be most artistically and effectively carried out, as what is worth doing at all is worth doing well. I am, &c.,

JAMES REVELL.

272 and 267, Oxford-street, W.

PATENTS.

SIR,—I never had, at any time, the most remote idea of ever being connected with Mr. Cole in the taking out of a patent for the application of magnesia to gutta percha—so that it should become thereby white, and applicable for shirt collars, &c. He evidently has mistaken what I meant as a joke for a serious idea of mine.

I am, &c., ROBT. H. COLLYER.

April 10th, 1863.

SEWING MACHINES.

SIR,—I much regret that I was unable to take part in the discussion that followed the able paper of Mr. Alexander, on the "Sewing Machine," last week. I must say that I was exceedingly disappointed at the tone and character of that discussion. Instead of receiving, as the Society of Arts had a right to expect, a fund of valuable information as to the order and character of the series of successive inventions which have at last resulted in the perfection of the sewing machine, the debate consisted of little more than contradictory statements as to whether such and such machine was invented or designed as a sewing machine, and whether or not the parties into whose hands these inventions fell, did, or did not, suitably reward the inventor. On some of these points statements were made which exhibit an astonishing amount of ignorance or a very wanton disregard of information which is patent to all who have taken any pains to become acquainted with the subject. It was stated by the last speaker, that Mr. Gibbons, who was associated with Mr. Fisher in the invention of 1844, had said very recently, that in that patent a sewing machine was not for a moment contemplated, and, *ergo*, that Mr. Fisher was not to be ranked as a sewing machine inventor. But when it is remembered that Mr. Gibbons had only a money interest in that patent, and that John Fisher was the sole inventor, then we have a right to accept John Fisher and his patent as the only credible witnesses; and his patent expressly describes his machine both for uniting fabrics and for ornamenting them. In this machine, which was undoubtedly intended for special application to stitching and ornamenting lace, Mr. Fisher employed the needle and shuttle for producing the lock-stitch, and the two needles for producing the knotted-stitch, the first being the identical features which Howe claimed to invent, and which he patented in America in his own name, and here in that of Mr. William Thomas.

There needs no other evidence of this, than the fact, that in connection with the litigation which took place in the years 1855 and 1856, Mr. Thomas found it necessary to disclaim, and that, too, avowedly for the reason that I have stated, first the use of needles and shuttles in the plural sense, and second, the use of a needle and shuttle at all, as part of the invention to be secured by letters patent. What, then, was Mr. Howe's invention? It is a curious circumstance that neither in Europe nor in America can two men—either lawyers or engineers—be found who will answer alike this question. To the present day it is loudly asserted in America that Howe was the inventor of the eye-pointed needle, and that this was the great step taken by him in advance of all predecessors. The same position was claimed for him here till the end of the year 1857, when in the action "Thomas *v.* Foxwell," it was clearly proved that the eye-pointed needle was first used in a modification of the machine patented by Newton and Archbold in 1841, for the purpose of stitching the backs of gloves. In the summing up on that occasion, Dec. 1857, Lord Campbell said that "the great novelty in Howe's invention was the use of pressing surfaces to hold the cloth firm while the needle passed through, and to prevent the bagging that would otherwise take place." I will explain what these pressing surfaces were, so that those unacquainted with the technicalities of the sewing machine may properly understand them. In hand sewing the fabric is held between the finger and thumb close to the point where the stitch is made, so as to present a firm surface to the action of the needle. In the sewing machine the main bed plate of the machine represents the finger, and the little presser foot which holds the fabric down, represents the thumb—the two combined, form the pressing surfaces, and perform precisely the same functions as the human digits. In the original machine of Howe there was an adjustable rigid plate which held the edge of the work tightly against the outside of the shuttle race, the fixed plate acting as the thumb, and the side of the shuttle race as the finger. Was there, then, anything in prior use corresponding with this? In the machine of Newton and Archbold, before referred to, the material to be stitched, kid or leather, was held firmly down by means of a clamp which held the back of the glove in the best position for stitching, this clamp in fact being the thumb, and the surface below of course the finger. In John Fisher's machine, the material being light, a bent wire performed the same function—these two instruments illustrating, in fact, that which is now recognised in all sewing machines, that a varying pressure is required for different fabrics. The yielding or elastic presser now generally applied was not known then, nor was it invented by Howe. But because I do not admit Howe's invention in the needle, in the combination of the needle with a shuttle, or in the use of pressing surfaces, I am not disposed to admit the assertion of another speaker, who would simply award him the almost infinitesimal merit of adapting a tension to the under or shuttle thread. On the contrary, I think that very great merit belongs to the general combination which Howe produced, and it was at the time a most valuable step gained. The great defect which characterised it was the absence of an effective feed motion, or apparatus for carrying the cloth forward as each stitch was completed, and which, had Howe invented, he would have deserved the most lavish encomiums which have been showered upon him.

The position I take, then, is this, that the sewing machine is English, and not American, in origin; that all the different stitches known to the sewing machine, viz., the chain or tambour, the lock or shuttle, and the knotted, or, as it is sometimes called, the double chain stitch, were all English inventions, together with the leading instruments used in the production of these stitches, and that we are indebted to America only for some novelties in the combination, and particularly for the serrated or rough surface feed, which, and which alone, literally makes the sewing machine a general and practicable machine adapted for the workshop or the family. As this last invention was never even thought of by Howe, but was invented and applied in America during Howe's stay in London, I shall not further dwell on it here as it properly belongs to another epoch in the history of this machine.

Let us now see how this invention was treated in England, and how the inventor was treated. There is a common adage, that "One story is very good till another is told," and if juries could decide after hearing the plaintiff's case, no doubt the administration of our law would be greatly simplified. We were given to understand the other night that Howe, the great inventor of all that was original or valuable in the sewing machine, came over from America to England, and fell among thieves, who stripped him of his inventions, cruelly illtreated him, and sent him back again to the States naked and destitute — that a man of large means, who ought to have known better, who paid large sums for minor subsequent patents, so

much as £5,000 for one, "doled out a paltry £200" to the great originator. In other words, Howe was a martyr in England, and only in America realised the reward of his transcendent genius. There is not a tittle of foundation for this. The facts are these:—In September, 1846, Elias Howe completed his machine, and obtained his American patent, and in or about the following month despatched his brother Amasa with a machine to this country to dispose of the invention and the right to patent; for, let it be observed, he had not taken out a patent, which, under the law then existing, was in fact, beyond his means. Amasa Howe, on his arrival, called on Mr. Newton, the patent agent of Chancery-lane, and applied for introductions to parties who might be likely to purchase the invention. By him he was introduced to Mr. William Thomas, of Cheapside, an extensive merchant and manufacturer of stays and shoes. He described the invention, and asked £500 for it; but, like the woman in the Roman legend, declined to show it till his price was paid. Mr. Thomas refused to buy a pig in a poke, or to look at a thing he could not see, and Mr. Howe then, on an assurance that no advantage should be taken, produced his brother's invention. The machine was considered at best a very doubtful experiment. The offer was declined, and he took the machine away. Ten days or more elapsed, during which it was offered to a variety of parties without success; nobody would buy it. He then called again with Mr. Newton, but unlike the woman in the legend, he this time offered the whole invention for half the price—£250—and the bargain was closed, Mr. Newton taking out the patent under Mr. Thomas's directions, and in his name, in December, 1846. While the patent was being completed, Mr. Amasa Howe stated to Mr. Thomas that his brother Elias was anxious to come over and pay a visit to this country, to have the opportunity of seeing our large mechanical works, and that he would be very useful to Mr. Thomas as a mechanic, if Mr. Thomas would pay his expenses out. This Mr. Thomas agreed to do, giving fifty guineas for this purpose, and arranging to give him the salary asked, namely, two guineas per week. It was in March, 1847, when Elias Howe arrived in this country, an illiterate but ingenious mechanic. To give him a comfortable position, Mr. Thomas voluntarily advanced his salary to three guineas per week. After being in his new situation a short time, Howe was anxious to bring out his wife and family, and for this purpose Mr. Thomas advanced him eighty guineas, and after their arrival advanced Mr. Howe's salary again to four guineas per week. For nearly two years, Mr. Howe was employed in Mr. Thomas's factory, in Newington-causeway. He was partly occupied in applying his machine, with different modifications, to the manufacture chiefly of stays, but also of shoes, in all of which applications the great defect found was the absence of a convenient mode of feeding the work, and during the whole of that time Mr. Howe made no improvement on his original baster plates. The only improvement that was ever made and applied to the original machine was invented by Mr. Frederick Thomas, shortly after Mr. Howe had left, and consisted in the application of an endless band in lieu of the lengths of baster plates heretofore used.

Mr. Howe was also employed on several other machines, for services in connection with which, independently of salary, he received various sums, amounting in the whole to several hundred pounds.

During this period he received altogether little if any short of one thousand pounds, yet he got into debt, and his brother got into debt, for which he became security; and some time after he left Mr. Thomas's service, which he did on his own account, he was sued on some of those debts, thrown into Whitecross-street, and passed through the Insolvent Debtors Court. Most persons will think that a man with ordinary prudence would have saved money; at all events they will see in these facts the evidence that there can be no ground whatever for the assertion that he was improperly or even illiberally treated by Mr. William Thomas. Justice to that gentleman, who has been most improperly attacked, requires that these facts should be made known. The assertion has been made that Mr. Thomas agreed to give Mr. Howe a royalty on the machines sold. In contradiction of this is the evidence of the agreement itself, which is in writing, and does not refer to it, and the further statement of Mr. Thomas, that during the whole 14 years of the patent, neither Mr. Elias Howe nor his brother, even in word or writing, mentioned such a thing to him. It is most improbable that either of the parties ever thought of it, and Mr. Thomas, intending the machine for use in his own trade exclusively, would certainly not be likely to entertain it.

I believe the statements thus made cannot be controverted in any way. I may remark, before leaving it, that the Howe machine, advanced as it was on its predecessor, was yet so far from practical commercial value, that a year after Howe's return to America its use, little as it was, was abandoned, and for three years after that, or for six years after Howe's invention, not one machine was brought into the market for sale. For the invention, such as it then was, untried, a liberal payment was made, and to the inventor and for his services a very liberal reward was given. The patent had half expired before the efforts of subsequent inventors had sufficiently perfected the sewing machine in any of its forms to give any value to Howe's patent, while the machine itself, without those later inventions, could never have been anything more than an ingenious toy. Perhaps these facts will correct the misrepresentations that have so frequently been made on this subject, and dispel the illusions which exist in some minds as to the persecutions and misfortunes of the inventor of the sewing machine.

Your space and my time will forbid me, in this letter, going into the subject of the invention of the sewing machines subsequent to Howe's, but I shall be happy to do it in a future communication, and it will give the opportunity then of canvassing the comparative merits of the different stitches and the different constructions of sewing machines, a subject, perhaps, of more universal interest than anything which merely relates to the history of the invention.

I am, &c.,

W. N. WILSON.

144, High Holborn, W.C., April 13th, 1863.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...British Architects, 8.
Medical, 8½. Dr. George Johnson, "On the Laryngoscope."
Asiatic, 3.

Tues. ...Civil Engineers, 8. 1. Discussion upon Mr. Brunton's paper on "The Scinde Railway." 2. Mr. Hawkshaw, "Account of the Cofferdam, the Syphons, and other works constructed in consequence of the failure of the St. Germain's Sluice of the Middle Level Drainage."
Zoological, 9.
Statistical, 8.
Pathological, 8.
Royal Inst., 3. Prof. Marshall, "On Animal Mechanics."
Architectural Museum, South Kensington, 7½. The Very Rev. the Dean of Ely, "On the Ely Lantern."
Anthropological, 7½.

Wed. ...Society of Arts, 8. Capt. T. E. Symonds, R. N., "On the Construction of Twin Screw Steam-Ships."
Geological, 8. 1. Sir R. I. Murchison, 'On the Gneiss and other Azoic Rocks, and on the superjacent Palæozoic Formations, of Bavaria and Bohemia." 2. Mr. R. Lightbody, "Notice of a Section at Mocktree, near Ludlow." Communicated by Mr. J. W. Salter.
R. Soc. Literature, 4. Annual Meeting.
Archæological Association, 8½. 1. Dr. Palmer, "On a newly discovered Roman villa in Berks, and an undescribed Camp in North Hants." 2. Professor Buckman, "On Roman Antiquities recently found at Corinium, and on Discoveries in other parts of Gloucestershire, and in Wilts." 3. Mr. Cuming, "On Peaked Hats."

Thurs. ...Royal, 8½.
Antiquaries, 2. Annual Meeting.
Royal Soc. Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."

FRI.....Royal Inst., 8. Mr. Alex. S. Herschel, "On Luminous Meteors."
R. Horticultural. Council, 11. Election of Fellows, and Ballot for Plants.
R. United Service Inst., 3. Mr. G. R. Burnell, "On the Progress of Military Science during the year 1862."
SAT.....Royal Botanic, 3¾.
Royal Inst., 3. Professor Max Muller, "On the Science of Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 3rd*, 1863.]

Dated 23rd March, 1863.

764. W. Johnston, Glasgow—Imp. in apparatus for lighting and heating.
766. J. Eyles, George-street, Portman-square—Imp. in cheffonier bedsteads.

Dated 24th March, 1863.

770. G. Davies, 1, Serle street, Lincoln's inn—Imp. in wrappers or papers for needles, and in machinery or apparatus for sticking needles therein. (A com.)
772. H. Williams, Portmadoc, Carnarvon—Imp. in machinery or apparatus for dressing slates.
774. J. Kirkham, Euston-road—Imp. in the manufacture of iron and steel.

Dated 25th March, 1863.

776. J. White, Finchley, Middlesex—Imp. in protecting the surface of the iron and steel of ships and all other structures, except that of cables, tanks, and boilers, while in contact with water, from decay; in preventing or abating and in facilitating the removal of foulness of ships' bottoms; and in giving a capacity of increased speed to ships.
778. J. Leach and J. Anderson, Ashton-under-Lyne—Certain imp. in machinery or apparatus for preparing and spinning cotton and other fibrous substances.
780. G. Stuart, Glasgow—Imp. in bleaching jute fibre.
782. R. Armitage, Huddersfield, and C. Senior, Dead Waters, near Huddersfield—Imp. in means or apparatus for stretching fabrics.
784. T. W. Gore, New Whittington, Derbyshire—An improved method of uniting earthenware, metal, and other pipes.

Dated 26th March, 1863.

788. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in treating steel and iron prepared by the pneumatic process.
792. W. Johnson, Warwick-square—Imp. in pocket books, purses, wallets and bill cases.
794. W. Tod and R. Paterson, Glasgow—Imp. in portable apparatus for working drills and other instruments.
796. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in furnaces or fire-places, and in apparatus to be used in connection therewith. (A com.)
798. W. Blake, Glasgow—Imp. in the manufacture of labels for luggage and other articles.
800. E. Easton, The Grove, Southwark—An improved application of hydraulic apparatus for lowering full casks and other goods, and raising empty casks or vessels.

[*From Gazette. April 10th*, 1863.]

Dated 28th November, 1862.

3194. W. Buller and J. H. Mugford, Bovey Tracy, Devonshire—Imp. in spur supporting rings for fixing plates, dishes, and other like articles in glost ovens.

Dated 16th December, 1862.

3364. H. Jorns, Tessin Grand Duchy of Mecklenburgh Schwerin—Imp. in clocks or time pieces.

Dated 4th February, 1863.

318. W. T. Weston, 4, Trafalgar-square, Charing-cross—An improved spring catch or fastening applicable to windows and other useful purposes.

Dated 5th March, 1863.

628. W. Clark, 53, Chancery-lane—Imp. in fire-arms. (A com.)

Dated 6th March, 1863.

641. H. R. Spicer, 3, Clement's-lane, Lombard-street—Imp. in protecting and preserving the bottoms and sides of ships and other submerged surfaces from oxidation, or fouling by incrustation, the attachment of barnacles, the action of animalculæ, or from any other like causes of injury.

Dated 17th March, 1863.

716. W. E. Newton, 66, Chancery-lane—An improved preparation for the cure of scab, foot rot, and other diseases of sheep and cattle. (A com.)

Dated 21st March, 1863.

757. E. Hartley, J. Clegg, T. Mellodew, and J. Mellodew, Oldham—Imp. in looms for weaving.
759. F. Applegate, Bradford-on-Avon, Wiltshire—Apparatus for making certain indications in railway carriages.

Dated 23rd March, 1863.

762. H. Hancock, 208, High-street, Southwark—A new combined range for making gas, cooking by gas, and lighting, especially applicable for ships.
763. J. W. H. Rothwell and E. J. Rothwell, Ramsbottom, Lancashire—Imp. in heating the feed water of steam boilers.
765. T. G. Grant, Royal Clarence-yard, Gosport—Imp. in ovens, and apparatus for heating the same.
767. W. Clark, 53, Chancery-lane—Imp. in agricultural apparatus. (A com.)

Dated 24th March, 1863.

769. J. Reilly, Barrack-street, Hulme, and W. Martin, Manchester—Imp. in lubricating horizontal shafting and bearings of all descriptions.
771. S. Healey, Elizabeth-street, Hackney-road—Imp. in the manufacture of zinc, and in the apparatus employed therein.
773. A. Topham, J. Topham, and J. Topham, St. Pierre les Calais, France- Imp. in the manufacture of ornamental twist lace, and in machinery used therein.
775. A. J. Cooke, Crown-court, Bow-street—Imp. in portable "Hooka" pipes.

Dated 25th March, 1863.

777. M. Phillipps, Dewsall, near Hereford—Imp. in the manufacture of iron or other metallic rod and wire, and in the machinery or apparatus employed in such manufacture.
779. J. H. Worrall, Bacup, Lancashire—Certain imp. in the method of producing surfaces in imitation of woods, and in printing therefrom.
781. C. Monson, New Haven, Connecticut, U.S.—An improved gravitation engine.
783. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of zinc, and in the apparatus employed therein. (A com.)
785. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of cords, ropes, and cables, and in machinery employed therein; applicable also to spinning, winding, and twisting fibrous and filamentous substances. (A com.)

Dated 26th March, 1863.

790. M. L. Parnell, 283, Strand—Imp. in the construction of locks, and in the method of adjusting their spindles.

Dated 27th March, 1863.

802. W. M. Morgan, Kidderminster—Imp. in coating metals, and in machinery and apparatus employed in coating metals.
804. J. Taylor, jun., Parliament-street, Westminster—Imp. in the construction and arrangement of the rain water pipes of buildings.

Dated 28th March, 1863.

808. B. W. Goode, St. Paul's square, Birmingham—A new journal axle, or bearing, particularly applicable to rolls.
810. R. Sims, Bedford Foundry, Leigh, Lancashire—Imp. in reaping and mowing machines, part of which imp. are applicable to horse works.
814. G. Thomas, 50, Chichester-villas, Kilburn-park—Imp. in window shutters and window blinds.

PATENTS SEALED.

[*From Gazette, April 14th*, 1863.]

April 13th.

2750. S. Chatwood
2751. G. Harvey and A. Harvey, jun.
2752. A. F. Gallis.
2755. W. Loeder.
2766. J. Snider, jun.
2769. M. Cartwright.
2770. R. A. Brooman.
2772. E. H. C. Monckton.
2773. O. J. Showell & J. Showell.
2777. W. Wilson.
2779. J. Taylor.
2782. W. Pope.
2788. R. A. Brooman.
2797. E. Humphreys.
2798. H. Ransford.
2800. J. Robinson.
2802. E. Nelson.
2803. J. Summerton.
2804. H. Wickens.
2813. B. Lauth.
2815. J. Fuller.
2846. H. H. Kromschroeder and J. F. G. Kromschroeder.
2863. A. J. F. Vigneulle-Brepson.
2885. J. H. Johnson.
2921. J. Unsworth.
2930. G. Piggott.
2937. W. R. Bowditch.
2959. W. E. Newton.
3111. J. B. Edmondson, J. Carson, and J. Blaylock.
3282. G. Lowry.
3443. E. Stevens.
8. J. Jones.
121. B. Burrows.
199. R. Penney.
301. T. Raworth.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, April 14th*, 1863.]

April 7th.

898. W. E. Newton.

April 8th.

887. H. Bridle.
923. J. Hill.

April 9th.

895. L. J. Repelin.
899. J. Rigby & W. N. Norman.
924. A. Bamlett.
1064. J. Bullough.

April 10th.

935. M. A. F. Mennons.
991. T. G. Dawes.

April 11th.

905. T. H. P. Dennis.
960. C. Vaughan, W. J. Vaughan, and R. Vaughan.
1107. M. Bonnor.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, April 14th*, 1863.]

April 6th.

846. W. H. Gauntlett.

April 7th.

902. W. Fuller.
915. H. Y. D. Scott.

April 8th.

895. H. F. Forbes.
1124. H. Tucker.